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ABSTRACT

This study examines racial/ethnic group differences in two- and four-year college enrollment rates of bachelor's degree aspirants, controlled for differences in expected costs and benefits, financial resources, academic characteristics, and social and cultural capital. The sample (n=7,832) is drawn from the National Educational Longitudinal Study (NELS:90/94), which surveys students during middle and high school and two years after high school. The study finds that despite an increase in the predisposition toward college, only 28 percent of African Americans and 20 percent of Hispanics were actually enrolled in a four-year institution during the fall after their expected high school graduations. The study concludes that when the econometric framework is expanded to include measures of social and cultural capital, college choice does not conform to a rational choice model. The findings suggest several reasons why African Americans and Hispanics are less likely than whites and Asians to enroll in a four-year college immediately after graduating from high school. Important factors include their under-representation among students enrolled in at least one advanced mathematics course; for Hispanics, another barrier appears to be related to the level of parental involvement; and for African Americans, the decision is influenced by the values, norms, and characteristics of the high school attended. (Contains 43 references.) (CH)

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RACIAL/ETHNIC GROUP DIFFERENCES IN THE REALIZATION OF EDUCATIONAL PLANS

by

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Abstract: Descriptive and multinomial logistic regression analyses are used to examine racial/ethnic group differences in two-year and four-year college enrollment among bachelor's degree aspirants after controlling for differences in expected costs and benefits, financial resources, academic characteristics, and social and cultural capital. The sample is drawn from the National Educational Longitudinal Study (NELS:90/94).

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RACIAL/ETHNIC GROUP DIFFERENCES

IN THE REALIZATION OF EDUCATIONAL PLANS

More students than ever before are aspiring to attain a college degree. Between 1980 and 1990, the percentage of high school sophomores who reported that they expected to earn at least a bachelor's degree rose substantially, from 39% to 69% (Nettles & Perna, 1997). The growth in educational expectations has been particularly dramatic among African Americans. About 70% of 1990 African American high school sophomores expected to finish college, compared with only 35% of 1980 African American high school sophomores. The percentage of African American high school sophomores who expect to finish college is now comparable to the percentage of Whites (Nettles & Perna, 1997).

Despite this increase in the predisposition toward college, however, challenges remain. The percentage of students who actually enroll in a four-year college or university continues to vary by racial/ethnic group, even when only those who reported aspiring to earn at least a bachelor's degree are considered. Analyses of the National Educational Longitudinal Study (NELS:90/94) reveal that, among all those who were high school sophomores in 1990, only 28% of African Americans and 20% of Hispanics were enrolled in a four-year college or university during fall 1992, the fall after their expected high school graduation, compared with 38% of Whites and 43% of Asians. Among 1990 high school sophomores who aspired to complete at least a bachelor's degree, only about 38% of African Americans and of Hispanics were enrolled in a four-year institution during the fall of 1992, compared with about 55% of Whites and Asians. These data suggest that only a fraction of 1990 sophomores are likely to realize their educational goals and that the percentage of students who will realize their goal varies by racial/ethnic group.

Certainly not all students have the desire or ability to enroll in college. This research is designed to contribute to our understanding of the barriers that limit college enrollment for students of different racial/ethnic groups by focusing specifically on the enrollment decisions of high school students who report that they expect to complete at least a bachelor's degree.

Pipeline to college

According to Hossler and Gallagher (1987), three stages characterize the college enrollment process: predisposition toward or interest in attending college; search for information about various colleges and universities; and choice of one college or university to attend. This study focuses on the characteristics and enrollment behavior of students who are predisposed toward college, as indicated by their self-reported educational expectations. Other researchers have concluded that a student's educational expectations are among the best predictors of college enrollment (Hossler, Schmit, & Vesper, 1999; McDonough, 1997).

Horn (1997) has suggested that the "pipeline" or path to enrollment in a four-year college or university has five sequential steps: aspiring to complete at least a bachelor's degree; becoming academically prepared to enroll in college; taking college entrance examinations; completing college admissions applications; and matriculating. Horn (1997) found that about two-thirds of all 1992 high school graduates aspired as 10^{th} graders to earn at least a bachelor's degree but that only 40% completed the next four steps including enrolling in a four-year institution. Her analyses focused on differences in the progression through the pipeline between students who were and were not at-risk of dropping out of high school with no attention to racial/ethnic group differences. Other research suggests that a smaller percent of Hispanic than of African American, Asian, and White 1992 high school graduates who are at least minimally academically qualified to attend a four-year college take college entrance exams and apply for admission to a four-year institution (Berkner & Chavez, 1997).

Examinations of differences in college enrollment across racial/ethnic groups have shown contradictory results. St. John and Noell (1989) found college enrollment rates to be comparable for African American, Hispanic, and White high school seniors after controlling for background, ability, and educational aspirations. African American college applicants were less likely than their White peers to enroll, however, after also controlling for financial aid offers. Other researchers have shown that, compared with their White counterparts and after controlling for

other differences, African American high school students are less likely to enroll in college (Nolfi, et al, 1978), are less likely to attend highly selective colleges and universities (Hearn, 1984), and are less likely to attend their first-choice institution (Hurtado, Inkelas, Briggs, & Rhee, 1997). Still other research suggests that African Americans are more likely than Whites to enroll in college (Catsiapis, 1987; Kane & Spizman, 1994; Perna, 2000) and tend to enroll in four-year rather than two-year colleges (Rouse, 1994) holding constant other variables.

The variables that predict college enrollment have been shown to vary by race/ethnicity. St. John (1991) found that African American high school seniors were more likely than White seniors to attend college when region, family background, ability, and high school experiences were controlled, but were no more likely than White seniors to attend when educational expectations were also controlled. Hispanic seniors were less likely than other students to attend college when region and family background were controlled, but no less likely than White students when test scores and high school experiences were also taken into account. Jackson (1990) showed that receiving financial aid had a stronger positive effect on the probability of enrolling in college for African American and Hispanic college applicants in 1980 than for their White counterparts, but that the positive effect of financial aid for Hispanics disappeared when background and academic characteristics were also held constant. Using data from the National Educational Longitudinal Study, Perna (2000) concluded that educational expectations were a less important predictor of four-year college enrollment for African American high school graduates than for Hispanic and White high school graduates.

One common approach to examining college enrollment behavior is economic (Hossler, Braxton, & Coopersmith, 1989; Hossler, Schmit, & Vesper, 1999). Econometric models posit that an individual makes a decision about attending college by comparing the benefits with the costs for all possible alternatives and then selecting the alternative with the greatest net benefit, given the individual's personal tastes and preferences (Hossler, Braxton & Coopersmith, 1989; Manski & Wise, 1983). The traditional econometric perspective predicts that the decision to

invest in higher education is influenced by expected costs and benefits, financial resources, academic ability, current and expected labor market opportunities, personal preferences and tastes, and uncertainty (Becker, 1962).

Based on her examination of differences in four-year college enrollment among African American, Hispanic, and White high school graduates, Perna (2000) concluded that the explanatory power of traditional econometric approaches to college enrollment decisions is improved when measures of social and cultural capital are used as proxies for differences in expectations, preferences, tastes, and certainty about higher education investment decisions. Qualitative research examining college enrollment behavior has utilized the sociological concepts of social and cultural capital to describe the ways in which knowledge and information about college, as well as the value placed on obtaining a college education, may influence college enrollment decisions (e.g., Freeman, 1997; McDonough, 1997). Like human capital and physical capital, social and cultural capital are resources that may be invested to enhance profitability (Bourdieu & Passeron, 1977) and productivity (Coleman, 1988) and facilitate upward mobility (DiMaggio & Mohr, 1985; Lamont & Lareau, 1988). Social capital may take the form of information-sharing channels and networks, as well as social norms, values, and expected behaviors (Coleman, 1988). Cultural capital is the system of factors derived from one's parents that defines an individual's class status (Bourdieu & Passeron, 1977). Members of the dominant class possess the most economically and symbolically valued kinds of cultural capital (Bourdieu & Passeron, 1977; McDonough, 1997).

Research method

This study draws upon the expanded econometric framework described by Perna (2000) to explore the facilitators of and barriers to college enrollment among high school sophomores who expected to earn at least a bachelor's degree and examines differences in the predictors of college enrollment among bachelor's degree aspirants of various racial/ethnic groups. Specifically, this study addresses the following research questions:

1. How do the characteristics of bachelor's degree aspirants vary across racial/ethnic group?
2. How do two-year and four-year college enrollment rates vary among bachelor's degree aspirants of different racial/ethnic groups after controlling for other variables related to college enrollment, including expected costs and benefits, financial resources, academic characteristics, and social and cultural capital?
3. How do the predictors of college enrollment vary among bachelor's degree aspirants of different racial/ethnic groups?

Sample

Data from the first (1990), second (1992), and third (1994) follow-ups to the National Educational Longitudinal Study (NELS:90/94) are used to examine the research questions. Sponsored by the U.S. Department of Education's National Center for Education Statistics, the NELS contains data for a cohort of students in the 8th grade (1988), when they are high school sophomores (1990), when they are high school seniors (1992), and when they are two years out of high school (1994). The sample used in this research is limited to individuals who, as members of the spring 1990 high school sophomore cohort, reported that they expected to complete at least a bachelor's degree. As other researchers have concluded, most students have formalized their educational plans by the tenth grade (Horn, 1997; Hossler & Stage, 1992; Hossler, Schmit, & Vesper, 1999) and enter the search stage of the college choice process during the junior year of high school (Hossler, Braxton, & Coopersmith, 1989).

The 1992-94 NCES panel weight (F3F1PNWT) is appropriate for approximating the population of 1990 bachelor's degree aspirants from the sample. To minimize the influence of large sample sizes and the non-simple random sample design on standard errors, each case is weighted by the NCES panel weight divided by the average weight for the sample. The adjusted weighted sample used in these analyses numbers 7,832, representing 1,659,873 students nationwide.

Analyses

Descriptive analyses, including chi-square and oneway ANOVA, are used to identify differences in the characteristics of African American, Asian, Hispanic, and White bachelor's degree aspirants. For the categorical variables, the chi-square value is adjusted for the relatively large sample sizes (even with the adjusted weight) to show the strength of the relationship using the formula: $\phi = \sqrt{(\chi^2/n)}$. For the continuous variables, differences among the four groups are examined further using orthogonal contrasts.

The dependent variable, college enrollment, is measured in October 1992, the fall following the student's scheduled graduation from high school. Three enrollment status categories are considered: 1) enrolled in a four-year college or university; 2) enrolled in a public two-year college; and 3) not enrolled. Students who are enrolled in a for-profit or less than two-year institution are classified as not enrolled.

Because the dependent variable includes three categories, a multinomial logistic regression model, a special case of the general log-linear model, is used to examine the relationship between race/ethnicity and college enrollment after controlling for other variables. Two contrasts are possible with three outcome categories. In this study, enrollment in a four-year institution and enrollment in a two-year institution are simultaneously contrasted to no enrollment.

Multinomial logistic regression models estimate the log-odds of one outcome occurring relative to another outcome. The interpretation of the multinomial logit coefficients is facilitated by the use of odds-ratios. The odds-ratio represents the change in the odds of choosing a particular enrollment status relative to the reference outcome (no enrollment) that is associated with a one-unit change in a particular independent variable. An odds-ratio greater than one represents an increase in the likelihood of four-year or two-year college enrollment relative to no enrollment, whereas an odds-ratio less than one represents a decrease in the likelihood of four-year or two-year college enrollment.

The continuous variables are entered into the model as covariates. The fit of the model is measured by the deviance chi-square, the change in –2 log likelihood when the model is compared to a saturated model. When the model fits well, the observed significance level is large (SPSS, 1999). The Pseudo-R^2 provides an indication off the strength of the relationship between the outcome variable and the independent variables. To examine racial/ethnic group differences in the predictors of college enrollment, the multinomial logit analyses are repeated for each of four groups: African Americans, Asians, Hispanics, and Whites.

Independent Variables

Following the example of Perna (2000), the college enrollment decision is expected to be a function of the following: expected costs and benefits, financial resources, academic characteristics, and social and cultural capital. The specific independent variables included in the analyses are based on the review of prior research and are operationalized based on the variables available in the NELS:90/94 database. Table 1 summarizes the predictor variables.

Insert Table 1 about here

As in prior research (e.g., Schwartz, 1985; Kane, 1994; Perna, 2000), the expected cost of attendance is measured by the average in-state tuition and fees at public four-year colleges and universities in the student's home state. The average in-district or local tuition and fees at public two-year colleges in the student's home state is also included. Both the average four-year and the average two-year tuition in each state were calculated from analyses of the 1992-93 Institutional Characteristics survey of the Integrated Postsecondary Education Data System and added to the NELS database. Expected benefits are measured by the expected occupation at age 30. Three categories are included: don't know, multiple response, or missing response; professional; or other. Labor market opportunities are expected to influence an individual's calculation of the expected costs and benefits. As in prior research (e.g., Rouse, 1994; Kane, 1994; Perna, 2000), labor market opportunities are measured by the unemployment rate in the state in which the

student attended high school. State unemployment rates were obtained from the Current Population Survey, March 1992 Supplement and added to the NELS database.

Students are also expected to consider their financial resources when determining the relative costs and benefits of investing in postsecondary education (Becker, 1962). Other researchers (e.g., Hossler, Schmit, & Vesper, 1999) have concluded that parental income is an important predictor of the realization of educational plans. In this research, financial resources are measured by a 15-category variable representing total family income in 1991. To minimize the amount of missing data, values are imputed for 15% of the cases based on the average value for students of the same race and socioeconomic status quartile.

Prior research consistently shows that individuals with greater ability, generally measured by test scores, are more likely to invest in higher education (Becker, 1962; Sewell, Haller & Ohlendorf, 1970; Alexander & Eckland, 1974; Catsiapis, 1987; Hossler, Braxton, & Coopersmith, 1989; St. John & Noell, 1989; Jackson, 1990; St. John, 1991; Kane & Spizman, 1994; Rouse, 1994; Perna, 2000). In this research, the composite score on the reading and mathematics tests administered as part of the NELS data collection in 1992 is the test score included in the model. Although admissions test scores would have been more reflective of the actual college enrollment process, about one-third of the cases were missing either SAT score or ACT score data. Because the correlations among SAT scores, ACT scores, and NELS composite test scores range from 0.825 to 0.890, the NELS test score is assumed to be an appropriate substitute. To minimize the amount of missing data, NELS test scores are imputed for 22% of the cases based on the average score for students of the same race and socioeconomic status quartile.

A second measure of academic ability and preparation that has been shown to promote college enrollment is participation in an academic or college preparatory curricular track in high school (Alexander & Eckland, 1974; Alwin & Otto, 1977; Thomas, 1980; Borus & Carpenter, 1984; Hossler, Braxton & Coopersmith, 1989; St. John & Noell, 1989; Jackson, 1990; St. John, 1991; Perna, 2000). Nonetheless, Adelman (1999) concluded that "academic track" is an

unreliable indicator of the quality and intensity of the high school curriculum. Some research (e.g., Horn, 1997) shows that taking at least one advanced mathematics course is associated with a higher probability of enrolling in a four-year college or university among students who are at-risk of dropping out of high school after controlling for other variables. Therefore, in this research the quality and intensity of the high school curriculum is measured by a series of dichotomous variables that reflect the highest level of mathematics completed: algebra I and geometry; algebra II; and at least one advanced math course. Other or no mathematics coursework is the reference category. To limit the amount of missing data, a dichotomous variable indicating whether mathematics coursework data are available is also included.

Following the example of Perna (2000), the model used in this study expands the traditional econometric approach by considering social and cultural capital to be resources that reflect an individual's expectations, preferences, tastes, and uncertainty about the college investment. One way social and cultural capital may influence expectations, preferences, and uncertainty about college investment decisions is through the provision of knowledge and information about college (DiMaggio & Mohr, 1985; McDonough, 1997). High school segregation and high school quality are included as two measures of the availability of information. High school segregation is measured by the representation of African Americans and Hispanics in the student body. To minimize the amount of missing data, data are imputed for 17% of the cases based on the average value for students of the same race and high school location (urban, rural, or suburban). High school quality is measured by the share of 1990-91 high school graduates enrolled in a four-year college or university. Missing data are imputed for 21% of the cases based on the average value for students of the same race and socioeconomic status quartile.

School personnel may also serve as a source of information about college enrollment procedures and requirements. Some evidence suggests that assistance from school personnel with college admissions applications is associated with a higher probability of enrolling in a four-year

college or university among students who are at-risk of dropping out of high school after controlling for other variables (Horn, 1997) and that receiving no help with college admissions requirements reduces the probability of enrolling in a four-year institution among high school graduates (Perna, 2000). In this study, school help with admissions requirements is measured by a series of dichotomous variables: received help at school with college application, financial aid application, and college essay; received no help with application, aid application, or essay; or received help with one or two of these items (reference category).

A second manifestation of social and cultural capital refers to the value placed on obtaining a college education (DiMaggio & Mohr, 1985; McDonough, 1997). Although the highest level of education attained by either parent is typically included in analyses of college enrollment behavior as a measure of parental encouragement for the student's educational attainment as well as the availability of information about how to acquire a college education (Hossler, Braxton, & Coopersmith, 1989; Rouse, 1994; Perna, 2000), parents' educational attainment is not included in the analyses for two reasons. First, some analyses suggest substantial discrepancies between the level of education reported by students and the actual level attained by the parents (Adelman, 1999). In addition, parental education is not a variable that is amenable to public policy intervention.

This study includes the following three indicators of parental encouragement and support for higher education: 1) parental expectations, measured by the highest level of education that the student perceives to be expected by the father and mother, 2) parental saving for the student's college education; and 3) a factor composite reflecting parental involvement in the student's education. As Hossler, Schmit, and Vesper (1999) noted based on their nine-year longitudinal study of the college going process among Indiana high school students, parental saving is likely to be perceived by the student as a "tangible commitment" to higher education. Following the example of others (e.g., Horn, 1997; Perna, 2000), parental involvement is a factor comprised of six variables in the NELS database measuring the frequency of discussions between students and

their parents about high school course selections, school activities, topics studied, grades, plans to take the SAT or ACT, and applying to college. The alpha reliability coefficient for this factor is 0.828.

Interactions with peers may also reflect accepted values, norms, and standards for behavior (Steinberg, 1996). One measure of peer encouragement for higher education found to be related to four-year college enrollment in prior research (e.g., Horn, 1997) is the share of peers planning to attend a four-year college or university. A second measure found to be associated with four-year college enrollment (Horn, 1997) reflects involvement in extracurricular activities. A series of dichotomous variables reflecting no, one, two, and three or more extracurricular activities (reference category) are included in the model. Participation in extracurricular activities may also facilitate the transmission of the types of knowledge and information required to succeed in educational settings.

Limitations

As with all secondary data analyses, the specification of the model is limited by the availability of appropriate measures in the NELS database. One potentially important, but unavailable, proxy for information availability is the number of siblings in college, a variable that has been found to be related to college enrollment behavior by other researchers (e.g., Manski & Wise, 1983; McDonough, 1997).

A second limitation is that, in an effort to preserve sample sizes, missing data are imputed for four variables (family income, test score, high school segregation, and high school quality) based on the average value for students of the same racial/ethnic group and socioeconomic status quartile. Imputing missing values in this manner results in an underestimation of the standard errors. As a result, the regression coefficients for these four variables may falsely appear to be statistically significant and, therefore, should be interpreted with caution.

A third limitation pertains to the relatively small numbers of Asians and American Indians in the sample. Asians are included in the analyses although the relatively small number

of Asians in the multinomial logistic regression analyses (n=299) restricts the power to detect statistically significant relationships. An even smaller number of American Indians in the sample (n=59) prohibits any meaningful examination of college enrollment for this group. Future research should further explore the college enrollment decisions of these two groups.

Findings

Characteristics of bachelor's degree aspirants

The descriptive analyses reveal that 69% of 1990 high school sophomores who aspired to complete at least a bachelor's degree were enrolled in a four-year or public two-year institution in the fall after graduating from high school. This is considerably lower than the finding by Hossler, Schmit, and Vesper (1999) that 82% of 10th graders with college aspirations attended some type of postsecondary educational institution after graduating from high school. Part of the difference is attributable to the definition of the outcome variable. About 5% of those classified as not enrolled in this study were enrolled in a private two-year, private for-profit, or public less than two-year institutions. These students would likely have been classified as enrolled by Hossler and his colleagues. In addition, because of the low response rates to the Hossler, Schmit, and Vesper (1999) nine-year longitudinal study (18% for the 8th and final survey), their sample likely overrepresents "successful" students.

The descriptive analyses also show that only 52% of 1990 high school sophomores who aspired to complete at least a bachelor's degree were enrolled in a four-year college or university in the fall after graduating from high school. The percentage of sophomores who took this step toward realizing their educational goals varies by racial/ethnic group. Table 2 shows that only 39% of African American and 37% of Hispanic bachelor's degree aspirants were enrolled in a four-year institution during the fall of 1992, compared with 56% of Whites and 55% of Asians. More than one-fifth of Hispanics (23%) and Asians (24%) were enrolled in public two-year colleges, compared with 17% of Whites and only 12% of African Americans.

Insert Table 2 about here

Racial/ethnic group differences in enrollment behavior

Table 3 shows the odds-ratios for four-year college enrollment and public two-year college enrollment relative to no enrollment for 1990 bachelor's degree aspirants overall and separately for bachelor's degree aspirants of each of four racial/ethnic groups: African Americans, Asians, Hispanics, and Whites. For all groups, the test of the final model indicating the probability that all of the variables in the model are jointly equal to zero is rejected at the 0.1% level. The difference in the percent of cases correctly classified (89% for four-year college enrollment and 22% for public two-year college enrollment) suggests that the model is substantially better for predicting four-year than public two-year college enrollment decisions.

Insert Table 3 about here

The multinomial logistic regression analyses reveal that, after controlling for sex, expected costs and benefits, financial resources, academic characteristics, and social and cultural capital, African Americans are more likely than students of other racial/ethnic groups to be enrolled in a four-year college or university in the fall after graduating from high school but less likely than students of other racial/ethnic groups to be enrolled in a public two-year college. The odds of being enrolled in either a four-year or public two-year institution in the fall after graduating from high school appear to be comparable for Asians, Hispanics, and Whites.

Conducting separate multinomial logistic regression analyses for each of the four groups suggests that the predictors of four-year and two-year college enrollment vary among bachelor's degree aspirants of different racial/ethnic groups. For example, among African Americans and Whites, women appear to be more likely than men to be enrolled in a four-year college after controlling for expected costs and benefits, financial resources, academic characteristics, and social and cultural capital. White women also are more likely than their White male counterparts to be enrolled in a public two-year college.

Sensitivity to the costs of attendance also appears to vary by race/ethnicity. An increase in two-year public college tuition and fees is associated with an increased likelihood of four-year

college enrollment among Hispanics and a decreased likelihood of two-year college enrollment among Whites. Contrary to expectations basedon human capital theory, an increase in the costs of attending a four-year college or university appears to be associated with an increased likelihood of four-year college enrollment among Asians.

The influence of financial resources onthe odds of college enrollment also varies by racial/ethnic group. Family income appears to be unrelated to the odds of either four-year or two-year college enrollment among both African Americans and Asians. Among Hispanics, a higher level of family income is associated with a greater likelihood of four-year college enrollment but is unrelated to public two-year college enrollment. Only among Whites does the likelihood of both four-year and public two-year college enrollment increase with family income.

Both test scores and the quality and intensity of the high school curriculum (as measured by mathematics coursework) are important predictors of college enrollment regardless of racial/ethnic group. Nonetheless, test scores appear to be a somewhat more important predictor, and advanced mathematics coursework appears to be a somewhat less important predictor, of four-year college enrollment for Asians than for bachelor's degree aspirants of other racial/ethnic groups. Completing at least one advanced mathematics course appears to be a particularly important predictor of four-year college enrollment for African Americans and Hispanics.

Various measures of social and cultural are also related to college enrollment behavior. While parents' educational expectations for the student are unrelated to either four-year or two-year college enrollment among bachelor's degree aspirants, other measures of parental support and encouragement are related. Parental involvement, as measured by the frequency of discussions with parents about school related issues, is positively related to the odds of four-year college enrollment for African Americans, Hispanics, and Whites. The odds of public two-year college enrollment also increase with the level of parental involvement among African Americans and Whites. Contrary to expectations, parental saving beginning in the 10th, 11th, or 12th grade

generally appears to be a more important predictor of public two-year college enrollment than of four-year college enrollment for African Americans, Hispanics, and Asians.

The influence of high school segregation also appears to vary across racial/ethnic groups. Contrary to expectations, the likelihood of enrolling in a four-year college or university is greater for African Americans who attend a high school in which African Americans and Hispanics comprised at least 30% of the student body than for African Americans who attended high schools with a smaller concentration of African Americans and Hispanics. For Asians, attending a high school with a higher representation of African Americans and Hispanics appears to be associated with a greater likelihood of public two-year college enrollment.

African American bachelor's degree aspirants who attend a high school in which fewer than one-half of the senior class goes on to a four-year college are less likely than other African Americans to enroll in a four-year college themselves, net of other differences. Whites who attend a high school in which fewer than 25% of the high school graduates enroll in a four-year college are more likely than other Whites to enroll in a public two-year college. Having no or only some friends who plan to attend a four-year college reduces the odds that a Hispanic bachelor's degree aspirant will attend a four-year college. Receiving help with all college related admissions requirements increases the odds of four-year college enrollment for Asians but is unrelated to four-year college enrollment for African Americans and Hispanics.

Discussion

The analyses presented in this study explored the predictors of college enrollment among high school students who had taken the first step in the process of enrolling in college, namely aspiring to complete at least a bachelor's degree. Several conclusions may be drawn from this research. First, in terms of racial/ethnic group differences in college enrollment behavior, both four-year and public two-year college enrollment rates appear to be comparable for Hispanic, Asian, and White bachelor's degree aspirants after controlling for differences in expected costs and benefits, financial resources, academic characteristics, and social and cultural capital. In

contrast, African American bachelor's degree aspirants appear to be more likely to enroll in a four-year college or university and less likely to enroll in a public two-year college than bachelor's degree aspirants of other racial/ethnic groups after taking into account other differences. As noted by Hurtado, Inkelas, Briggs, and Rhee (1997), however, only a small number of African Americans are "equal" to Whites in terms of all other characteristics. Specifically, the descriptive statistics (Table 2) show that, compared to White bachelor's degree aspirants, African American bachelor's degree aspirants average lower family incomes and test scores, have had less rigorous mathematics coursework, and attend high schools in which smaller proportions of students go on to college.

The analyses also support the conclusion of Perna (2000) that an econometric framework that has been expanded to include measures of social and cultural capital as proxies for differences in expectations, preferences, tastes, and uncertainty is an appropriate conceptual framework for exploring racial/ethnic group differences in college enrollment behavior. Expanding the traditional econometric model to include measures of social and cultural capital builds on McDonough's (1997) conclusion that the college choice process does not conform to the economist's rational choice model. Moreover, much of the econometric research on college enrollment behavior focuses on family background and academic ability to explain observed differences in enrollment rates. The results of such analyses are often fairly pessimistic since such variables as parental education and test scores have not been amenable to public policy. In contrast, by explicitly examining the influence of social and cultural capital – measures of the ways in which parents' education and class status may influence enrollment decisions – on college enrollment decisions, the results of this research suggest several types of policies and practices that may be more likely to result in increased college enrollment rates.

Specifically, the findings from this study suggest several reasons why African Americans and Hispanics who expect to earn at least a bachelor's degree may be less likely than Whites and Asians to take one of the critical steps toward realizing their goal, namely enrolling in a four-year

college or university in the fall after graduating from high school. For example, one important barrier to four-year college enrollment for African Americans and Hispanics appears to be their relative underrepresentation among students enrolled in at least one advanced mathematics course. The descriptive analyses reveal that only 16% of African American and 18% of Hispanic bachelor's degree aspirants have taken at least one advanced mathematics course, compared with 32% of White and 43% of Asian bachelor's degree aspirants. The substantial increase in the odds of enrolling in a four-year college associated with completing at least one advanced mathematics course raises important issues of educational equity since the highest levels of mathematics are not available in all schools. Two lawsuits filed in 1999 in California charge that limited access to advanced placement courses disadvantages African American and Hispanic students in the college admissions process. Among the policies that may begin to address this inequity in the quality and intensity of the curriculum are allowing high school students to take courses at local community colleges with credit awarded to the student from both the high school and the community college, providing additional funds to train teachers and enhance high school course offerings, and offering advanced courses on-line (Adelman, 1999; Hebel, 1999).

Another barrier to four-year college enrollment for Hispanics appears to be related to the level of parental involvement. While the odds of enrolling in a four-year college or university increase for both African American and Hispanic bachelor's degree aspirants with the level of parental involvement, the average level of parental involvement is observed to be lower for Hispanics than for African Americans and Whites (Table 2). Efforts to increase parental involvement should recognize that the decision to become involved in the child's education is likely a function of the parents' role construction or beliefs about appropriate behavior, the parents' sense of efficacy for helping the student succeed in school, and the parents' perception of being invited by the school and the student to participate (Hoover-Dempsey & Sandler, 1997). Parental involvement among Hispanics may be limited by a lack of relevant resources (e.g., their

own educational attainment, occupational status, work schedule flexibility) and/or different patterns of family life (e.g., kinship ties, socialization patterns, leisure activities) (Lareau, 1987).

This research also suggests that, for African Americans, the decision to enroll in a four-year college or university is influenced by the values, norms, and other characteristics of the high school attended. Specifically, the multinomial logistic regression analyses show that, after taking into account other differences, four-year college enrollment rates are higher for African Americans who attend segregated high schools and high schools in which the majority of graduates attend a four-year college than for other African Americans. Some caution is necessary in interpreting this finding, however. The descriptive analyses reveal that 54% of African American bachelor's degree aspirants attend a high school in which African Americans and Hispanics comprise at least 60% of the student body. As Orfield (1988) concluded based on his examination of trends in White and minority student experiences in Los Angeles high schools, community colleges, and universities, racial/ethnic group segregation is related to economic segregation and both forms of segregation are related to such measures of educational inequality as high school graduation rates, repeated grades, attendance, and test scores. In other words, only a very small number of African Americans who attend segregated high schools are comparable to African Americans who attend integrated high schools in terms of such important college-enrollment related variables as family income, test scores, and mathematics coursework. Nonetheless, future research should explore the particular characteristics of segregated high schools that may, at the margin, promote four-year college enrollment after controlling for other variables, such as differences in the availability of information about four-year colleges, particularly four-year historically Black colleges and universities, and differences in the ways in which school personnel are communicating to students the value of higher education.

Directions for future research

This study also suggests at least three areas for future research. One area for future research pertains to the most appropriate ways to measure social and cultural capital. While the

results of this study demonstrate the usefulness of an expanded econometric model for examining racial/ethnic group differences in college enrollment behavior, the results also suggest that additional and/or more appropriate measures of social and cultural capital are needed to further develop our understanding of the barriers that limit college enrollment for students of different racial/ethnic groups. For example, the results of this research suggest that four-year college enrollment rates are higher for African Americans who attend high schools in which at least 50% of high school graduates enter four-year colleges. Particularly for those interested in the implications of such research for policy and practice, better measures are required to understand the specific ways in which high school context influences college enrollment behavior. For example, is this measure of "high school quality" really a proxy for the availability and accessibility of appropriate college guidance counseling?

Second, as evidenced by both the percent of cases correctly classified and the number of statistically significant predictors, the expanded econometric model of college enrollment used in this research is substantially better for predicting four-year college enrollment decisions than for predicting public two-year college enrollment decisions. While students who enroll in two-year institutions likely realize many benefits, only a fraction are likely to complete a bachelor's degree (Lavin & Hyllegard, 1996). Analyses of the Beginning Postsecondary Student Survey show that only about one-fifth of students who enroll in a two-year college transfer to a four-year college or university within five years and that transfer rates are lower for African Americans than for Whites (Nettles, Perna, & Edelin, 1999). In this study, the descriptive analyses show that more than one-fifth of 1990 Asian and Hispanic bachelor's degree aspirants enrolled in a public two-year college in the fall after graduating from high school. Therefore, more needs to be learned about the predictors of public two-year college enrollment. Clearly students are considering different criteria, and applying different weights to these criteria, when considering whether to attend a two-year rather than a four-year institution.

Finally, future research should further explore the sex differences in college enrollment found in this study. The multinomial logistic regression analyses show that, among African American and White bachelor's degree aspirants, women are more likely than men to enroll in a four-year college even after controlling for expected costs and benefits, financial resources, academic characteristics, and social and cultural capital. As evidenced in part by a November 1999 conference entitled, "Fewer Men on Campus: A Puzzle for Liberal Arts Colleges and Universities," college leaders are becoming increasingly concerned about the growing gender imbalance in their undergraduate student bodies (Gose, 1999). Although the number of male undergraduates increased by 11% between 1976 and 1996, the number of female undergraduates increased at a faster rate (51%) (NCES, 1999). Because of the differential growth rates, the representation of men among undergraduates has declined from 52% in 1976, to 48% in 1980, to 44% in 1996. With the exception of nonresident aliens, the number of women undergraduates exceeds the number of men undergraduates regardless of race/ethnicity. But, the magnitude of the gender gap in undergraduate enrollments varies by racial/ethnic group. In fall 1996 women represented 62% of African American undergraduates, compared with 51% of Asians, 55% of Whites, 56% of Hispanics, and 59% of American Indians/Alaskan Natives (NCES, 1999). The analyses presented in this research suggest that, among African Americans and Whites, these observed sex differences are not entirely attributable to differences between women and men in variables that are expected to be related to college enrollment. Therefore, future research should continue to recognize the diversity of student experiences by exploring reasons for differences in college enrollment between women and men of the same racial/ethnic group.

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Table 1. Predictors of college enrollment

Predictor	Variable
Sex	Female
Race/ethnicity	African American (1=yes), Hispanic (1=yes), and Asian (1=yes). White is the reference group.
Expected costs and benefits	
Four-year college tuition	Average in-state tuition and fees at public four-year colleges and universities in student's home state, divided by 100. Range: 2.19 to 30.46
Two-year college tuition	Average local tuition and fees at public two-year colleges in student's home state, divided by 100. Range: 4.15 to 42.65
Expected occupation	Expected occupation at age 30: 1= Don't know, multiple response, or missing response; 2 = professional; 3 = other.
State unemployment rate	Calculated from the Current Population Survey, March 1992 Supplement.
Financial resources	
Family income	15 category variable representing total family income from all sources in 1991; 0 = none, 15 = more than $200,000. Missing values imputed for 15% of the cases based on the average value for students of the same race and socioeconomic status quartile.
Academic characteristics	
Test score	Composite score on the reading and mathematics tests administered as part of the NELS data collection. Missing values imputed for 22% of the cases based on the average value for students of the same race and SES quartile.
Mathematics coursework	Highest level of mathematics coursework completed: no mathematics coursework data available; Algebra I and geometry, Algebra II, at least one advanced math course. No math or non-academic math coursework is the reference category.
Social and cultural capital	
High school segregation	African Americans and Hispanics comprise 10% to 29% of all students (1 = yes), 30% to 59% of all students (1 = yes), or more than 60% of students (1 = yes). Less than 10% is the omitted/reference category. Missing data are imputed for 17% of the cases based on the average value for students of the same race and high school location (urban, suburban, rural).
High school quality	Percent of 1990-91 high school graduates enrolled in 4-year college; 1 = 0%, 6 = 100%. Missing values imputed for 21% of the cases based on the average for students of the same race and socioeconomic status quartile.
School help with admissions	Student received help at high school with college application, financial aid application, and college essay (1 = yes) and student received no help with application, financial aid, or essay (1 = yes). Receiving help with one or two of these items is the reference category.
Parental expectations	Highest level of education expected for the student by the father and mother: 1=no more than high school, 2=some college, 3=finish college, 4=advanced degree.
Parental saving	Parent started saving for the student's college education before the student entered the 10th grade (1=yes) or while the student was in the 10th, 11th, or 12th grades (1=yes). No savings or no response is the reference category.
Parental involvement	Factor composite comprised of six variables. Alpha reliability coefficient = 0.828.
Peer plans	Share of friends planning to attend a four-year college; 1=none, 2=some, 3=most, 4=all.
Extracurricular activities	Participated in no, one, or two extracurricular activities. Participating in three or more activities is the reference category.

Table 2. Selected characteristics of 1990 bachelor's degree aspirants by racial/ethnic group

Variable	Total	African American	Hispanic	Asian	White	Statistical significance
Enrollment status						$\phi = 0.19$
Total	100%	100%	100%	100%	100%	
Enrolled in 4-year	51.9	38.6	37.4	55.1	55.7	
Enrolled in public 2-year	16.9	12.3	22.5	23.5	16.7	
Not enrolled or other enrollment	31.2	49.1	40.1	21.3	27.6	
Occupational aspirations for age 30						$\phi = 0.09$
Total	100%	100%	100%	100%	100%	
Don't know/missing data	13.8	16.8	15.2	19.0	12.9	
Professional	56.3	58.9	54.9	60.4	55.8	
Other	30.0	24.4	29.9	20.6	31.4	
Family income						W>A>H>AA
Mean	10.7	9.0	9.3	10.7	11.1	
Standard deviation	2.3	2.6	2.4	2.5	2.0	
Test score						(W=A)>H>AA
Mean	54.5	47.5	49.6	56.5	56.1	
Standard deviation	8.1	7.5	8.0	8.0	7.3	
Mathematics coursework						$\phi = 0.24$
Total	100%	100%	100%	100%	100%	
Math data missing	16.4	23.6	19.2	16.8	14.7	
No math or non-academic math courses	14.0	27.9	23.0	8.8	10.9	
Algebra I & geometry	11.4	12.8	13.3	8.2	11.1	
Algebra II	29.0	20.0	26.7	23.6	31.2	
At least one advanced math course	29.2	15.7	17.8	42.6	32.1	
% Blacks & Hispanics						$\phi = 0.68$
Total	100%	100%	100%	100%	100%	
Less than 10%	48.6	6.0	10.1	32.2	60.8	
10% to 29%	26.2	15.8	15.0	32.5	28.7	
30% to 59%	12.6	24.6	25.7	27.5	8.3	
60% or more	12.6	53.6	49.2	7.7	2.2	
% graduates in 4-year college						$\phi = 0.15$
Total	100%	100%	100%	100%	100%	
10% or less	3.3	3.4	3.9	2.8	3.2	
11-24%	11.3	10.0	14.9	15.0	10.9	
25-49%	48.3	59.9	57.8	41.8	45.5	
50-74%	25.8	19.3	17.1	26.6	28.0	
75-100%	11.3	7.4	6.3	13.9	12.4	

Table 2. Selected characteristics of 1990 bachelor's degree aspirants by racial/ethnic group (continued)

Variable	Total	African American	Hispanic	Asian	White	Statistical significance
Help with college requirements						$\phi = 0.08$
Total	100%	100%	100%	100%	100%	
No help	38.5	37.8	38.4	35.2	38.8	
Help with some requirements	45.1	42.4	38.4	48.9	46.1	
Help with all three	16.4	19.8	23.3	15.9	15.0	
Parents' expectations						$\phi = 0.13$
Total	100%	100%	100%	100%	100%	
Less than bachelor's degree	10.7	15.4	14.8	8.4	9.7	
Bachelor's degree	56.7	44.7	52.4	44.8	59.9	
Advanced degree	32.6	39.9	32.8	46.8	30.5	
Grade parents started college saving						$\phi = 0.17$
Total	100%	100%	100%	100%	100%	
10, 11, or 12th grade	23.6	22.5	21.7	25.0	23.9	
Prior to 10th grade	39.6	29.2	23.8	34.9	43.5	
No saving or no response	36.8	48.3	54.5	40.1	32.6	
Parental involvement						AA>W>H>A
Mean	0.00	0.05	-0.10	-0.30	0.02	
Standard deviation	1.00	1.10	1.17	1.05	0.96	
Share of friends planning 4-year						$\phi = 0.13$
Total	100%	100%	100%	100%	100%	
None or a few	13.1	21.8	19.6	10.0	11.4	
Some	17.4	14.1	21.2	14.3	17.5	
Most	52.1	48.4	45.2	49.5	53.6	
All	17.4	15.7	14.0	26.1	17.5	
Number of extracurricular activities						$\phi = 0.07$
Total	100%	100%	100%	100%	100%	
None	13.0	14.6	16.5	15.3	12.2	
One	19.8	20.8	23.6	13.9	19.6	
Two	21.9	19.0	20.6	19.0	22.8	
Three or more	45.2	45.6	39.3	51.7	45.3	

Note: For the categorical variables, the statistical difference column shows the strength of the relationship, calculated using the following formula: $\phi = \sqrt{(\chi^2/n)}$. A ϕ that is below 0.3 represents a "small" effect size; a ϕ that is greater than 0.5 is "large". For the continuous variables, this column shows differences between the four groups found using orthogonal contrasts.

Source: Analyses of NELS:90/94

Table 3. Odds-ratios for college enrollment status in October 1992 among 1990 bachelor's degree aspirants by race/ethnicity

	Total	
Independent variable	4-year	2-year
African American	1.40*	0.59**
Hispanic	1.16	1.17
Asian	1.14	1.39
Female	1.30***	1.28**
4-year tuition	1.01	1.00
2-year tuition	1.00	0.96***
No occupational aspirations	1.12	1.08
Professional occupation	1.08	0.97
Unemployment rate	0.97	1.19***
Family income	1.13***	1.10***
Test score	1.06***	0.99
No math coursework data	2.93***	1.13
Algebra I and geometry	2.34***	2.07***
Algebra II	5.73***	2.28***
At least 1 advanced math	10.41***	2.55***
10-29% Black & Hispanic	0.97	1.07
30-59% Black & Hispanic	1.19	1.31*
60% or more Black & Hispanic	1.22	0.63*
Less than 25% graduates in 4-year	0.70*	2.19***
25-49% graduates in 4-year	0.74*	1.42*
50-74% graduates in 4-year	1.31	1.32
No help with college requirements	0.69***	0.83*
Help with all college requirements	1.13	0.79
Parents' expect less than bachelor's	1.02	1.28
Parents' expect finish college	0.93	1.18
Started saving in 10, 11, or 12th grade	1.53***	1.57***
Started saving prior to 10th grade	1.76***	1.51***
Parental involvement	1.37***	1.17***
No friends planning 4-year college	0.35***	1.17
Some friends planning 4-year college	0.40***	1.40*
Most friends planning 4-year college	0.88	1.50**
No extracurricular activities	0.61***	1.10
One extracurricular activity	0.70***	1.13
Two extracurricular activities	1.08	1.32*
Number of cases in the analyses	6,426	
Improvement in fit – χ^2	2,764 68***	
Pseudo R^2 (Cox & Snell)	0.350	
Percent classified correctly	89%	22%

* $p < .05$, ** $p < .01$, *** $p < .001$
Source: Analyses of NELS:90/94

Table 3. Odds-ratios for college enrollment status in October 1992 among 1990 bachelor's degree aspirants by race/ethnicity (Continued)

	African American		Hispanic	
Independent variable	4-year	2-year	4-year	2-year
Female	1.95**	1.17	0.74	1.10
4-year tuition	1.01	0.97	1.00	1.03
2-year tuition	1.00	0.99	1.11*	0.94
No occupational aspirations	1.14	1.37	0.41	0.59
Professional occupation	0.86	1.05	1.12	0.64
Unemployment rate	0.88	1.17	1.23	1.51
Family income	1.05	1.06	1.20**	1.12
Test score	1.04*	0.98	1.06**	1.02
No math coursework data	3.09**	1.40	3.61*	3.43*
Algebra I and geometry	2.64*	3.45*	2.90	1.30
Algebra II	6.64***	2.14	7.44***	1.47
At least 1 advanced math	16.79***	2.40	13.53***	1.45
10-29% Black & Hispanic	3.29*	2.64	1.15	1.04
30-59% Black & Hispanic	6.56***	3.41	1.15	0.89
60% or more Black & Hispanic	4.60**	1.69	1.58	0.43
Less than 25% graduates in 4-year	0.18**	7.47	0.99	1.61
25-49% graduates in 4-year	0.21**	2.40	1.03	1.78
50-74% graduates in 4-year	0.40	3.17	1.86	1.22
No help with college requirements	0.96	0.20***	0.89	1.09
Help with all college requirements	1.10	0.27**	1.62	1.18
Parents' expect less than bachelor's	1.95	2.03	1.04	0.53
Parents' expect finish college	1.10	1.33	0.72	0.64
Started saving in 10, 11, or 12th grade	1.79*	3.58**	1.75	3.24**
Started saving prior to 10th grade	1.81*	2.99*	1.06	0.81
Parental involvement	1.41**	1.65**	1.33*	1.24
No friends planning 4-year college	0.51	0.45	0.33*	0.97
Some friends planning 4-year college	0.38*	0.86	0.32*	1.04
Most friends planning 4-year college	1.07	0.91	0.48	0.71
No extracurricular activities	0.59	1.17	0.54	0.60
One extracurricular activity	0.57*	0.44	0.51	1.67
Two extracurricular activities	1.00	0.93	0.73	1.34
Number of cases in the analyses	634		453	
Improvement in fit – χ^2	333 62***		266 62***	
Pseudo R^2 (Cox & Snell)	0.408		0.444	
Percent classified correctly	77%	27%	79%	48%

* $p < .05$, ** $p < .01$, *** $p < .001$

Source: Analyses of NELS:90/94

Table 3. Odds-ratios for college enrollment status in October 1992 among 1990 bachelor's degree aspirants by race/ethnicity (Continued)

	Asian		White	
Independent variable	4-year	2-year	4-year	2-year
Female	1.53	1.08	1.26**	1.35**
4-year tuition	1.11*	1.11	1.01	1.00
2-year tuition	0.98	0.90	1.00	0.97**
No occupational aspirations	0.54	0.89	1.21	1.11
Professional occupation	0.85	0.78	1.15	1.04
Unemployment rate	0.90	1.30	0.96	1.16***
Family income	0.99	1.08	1.18 ***	1.11***
Test score	1.14***	1.00	1.07***	0.99
No math coursework data	5.99	3.36	2.53***	0.85
Algebra I and geometry	2.67	2.06	2.22***	2.13***
Algebra II	3.39	1.63	5.80***	2.41***
At least 1 advanced math	8.61*	0.89	10.27***	2.95***
10-29% Black & Hispanic	1.20	3.87*	0.94	1.04
30-59% Black & Hispanic	2.32	5.10*	0.90	1.05
60% or more Black & Hispanic	1.94	1.31	0.89	0.58
Less than 25% graduates in 4-year	1.35	3.99	0.77	2.21***
25-49% graduates in 4-year	1.26	1.73	0.79	1.40
50-74% graduates in 4-year	2.71	3.11	1.37*	1.31
No help with college requirements	1.49	1.28	0.64***	0.85
Help with all college requirements	7.22**	2.38	1.01	0.80
Parents' expect less than bachelor's	0.37	1.07	0.96	1.27
Parents' expect finish college	0.58	0.96	0.95	1.22
Started saving in 10, 11, or 12th grade	2.38	3.43*	1.46***	1.31*
Started saving prior to 10th grade	1.25	0.87	1.83***	1.55***
Parental involvement	1.07	1.23	1.43***	1.16**
No friends planning 4-year college	0.36	1.12	0.35***	1.37
Some friends planning 4-year college	0.63	3.30	0.43***	1.58*
Most friends planning 4-year college	1.30	2.52	0.94	1.68**
No extracurricular activities	0.90	1.20	0.57***	1.13
One extracurricular activity	1.52	0.94	0.74**	1.18
Two extracurricular activities	2.16	2.72	1.09	1.28
Number of cases in the analyses	299		5,005	
Improvement in fit – χ^2	194 62***		2,128 62***	
Pseudo R^2 (Cox & Snell)	0.478		0.346	
Percent classified correctly	89%	63%	90%	21%

* p < .05, ** p < .01, *** p < .001

Source: Analyses of NELS:90/94